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UNIVERSITY OF ALBERTA

DAYLIGHT OR SOCIAL FACTORS: WHAT IS SAD?



BY

REEVAN DOLGOY

A thesis submitted to the Faculty of Graduate Studies and
Research in partial fulfilment of the requirements for the
degree of MASTER OF ARTS

Department of SOCIOLOGY

Edmonton, Alberta
SPRING, 1994

UNIVERSITY OF ALBERTA

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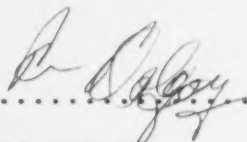
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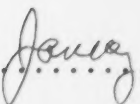
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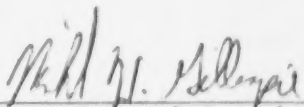
ISBN 0-612-11188-1

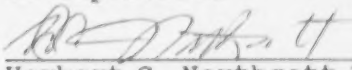
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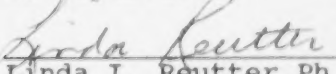
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Date Jan 3, 1994

This thesis is dedicated to my parents

MAX AND RAYE DOLGOY

ABSTRACT

The present research problem arises from a contradiction in the epidemiological literature on Seasonal Affective Disorder. Most of the epidemiological studies on SAD report widespread symptoms of the syndrome in the general population. Moreover, clinical research has produced the alleviation of symptoms using phototherapy. The causal direction proposed by the epidemiological literature is clearly based on light as the independent variable. These studies employ questionnaires which ask respondents to retrospectively rate various mood, dietary, sociability and sleep changes that occur during the seasons of the year. None of these studies compares symptoms across time.

In contrast, a study conducted over four months in northern Norway, which asked respondents to report their current mood states, found no differences in depression during months in which there was a great deal of daylight and months in which daylight levels were low. These findings call into question the role which light plays in conditioning mood in populations.

Two competing hypotheses were tested. The first predicted that there would be a variation in mood in a population, corresponding to the amount of daylight, as measured by month of year. The second predicted that there would be a relationship between current psychological malaise and its

attribution to winter and seasonal conditions.

The first hypothesis was not supported by the data, based on the measures used. The second hypothesis was supported by the data. This result suggests that factors such as attribution, sociability and current job fatigue, may play a part in the implication of seasonal and winter conditions as a cause of mood. This interpretation gains further salience from the findings of the test of the first hypothesis, which offered little support for a theory of population mood conditioned by daylight.

ACKNOWLEDGEMENTS

I would like to thank the department of Sociology for their consideration and support for a late blooming but enthusiastic graduate student. A number of individuals have provided invaluable assistance during the writing of my thesis. They include Drs. John Gartrell, Les Hayduk, P. Krishnan, Frank Travato and fellow student Frank Avakame.

I would like to acknowledge the input of my thesis committee, chaired by supervisor Dr. Mike Gillespie and co-supervisor Dr. Herb Northcott. I commend Dr. Gillespie for his appreciation of my thesis topic as an area for research in sociology as well as his understanding of the role of the stress and attribution processes as they relate to it. Thanks also goes to Dr. Northcott for his perseverance in teaching me many of the fundamentals of the scientific method in the social sciences as well as the clarity of his thinking as problems arose. I have also appreciated the efforts of committee member, Dr. Linda Reutter for her contributions to my effort.

The office staff of the department has been most helpful as have been Cliff Kinzel, Dave Odynak and N.M. Lalu of the Population Research Laboratory at the University of Alberta. Special mention should also be made of my family and friends whose support has been incalculable.

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CHAPTER 1 - INTRODUCTION

With the notable exception of Durkheim (1951), who dismissed climate and seasonal temperature as a cause of suicide, the sociological literature has had little to say about seasonal mood. The systematic exploration of the relationship between the seasons, light and depression was initiated in the 1980's by clinical psychiatry. New findings regarding photo-periodicity, brain chemistry and their link to psychological well-being, made possible the first inroads into understanding the long suggested relationship between the seasons and depression (Rosenthal et al., 1984; 1985). A new syndrome called Seasonal Affective Disorder (SAD) was described (Rosenthal et al. 1984; 1985). This syndrome included sleep, eating, mood and sociability disorders, which correlated with the short days of fall and winter. Hot summer days were later implicated as the cause of summer SAD (Wehr et al. 1987b).

At the clinical level, three hypotheses have been proposed as physiogenic models for understanding how winter SAD works. They are the melatonin hypothesis, the phase-shift hypothesis and the photon counting hypothesis. They describe three different possible effects of light on human physiology that lead to the symptoms of SAD. These are dealt with in more detail later in this paper but they simply state that no

matter what the mechanism, the absence of daylight causes SAD.

SAD is usually assessed clinically by employing the Seasonal Pattern Assessment Questionnaire (SPAQ) developed by Rosenthal and his associates. 'Seasonality' or the degree to which mood is affected by season, is determined through a patient's retrospective self-reporting of variations in mood, sleep, weight, sociability and eating behaviour as well as questions on the effects of season and weather. Phototherapy is the most common form of treatment.

Numerous journal articles have dealt with the Seasonal Affective Disorder syndrome at the clinical level in the almost ten years since it was first described. These studies include the confirmation of the symptoms of SAD, the efficacy of various therapies and the development of competing hypotheses regarding the physiogenic mechanisms that may be operating in SAD.

In addition to articles on the clinical aspects of SAD, some studies claim to have found widespread winter Seasonal Affective Disorder in populations (Kasper et al. 1989a; Rosen et al., 1990; Rosen and Maghadan, 1991; Spont, Depue and Kraus, 1991). Most of the instruments used in these studies were versions of the Seasonal Pattern Assessment Questionnaire in which respondents were asked to retrospectively report a

number of seasonal changes including mood, weight, fatigue, sociability and sleep patterns.

One study, however, stands in contrast to the findings of these epidemiological studies. It was conducted over four months by Hansen, Jacobsen and Husby (1991) in northern Norway, where the literature would predict high levels of winter depression. Hansen et al. employed a sample of more than seven thousand, all living above the Arctic Circle. They found relatively low depression levels with no statistically significant variation in mood between months in which there was daylight and months in which it was almost completely dark.

The Norwegian researchers employed questions which referred only to current states. Respondents were not required to retrospectively assess the effects of season, weather or daylight on their moods. As the general literature on SAD predicts a variation in depression in populations due to the relative absence of winter daylight, the Norwegian study should have turned up a variation in mood between months in which there was light and months in which there was none. It did not.

How can these competing findings be explained? Does the retrospective self rating of winter mood result in individuals

attributing or constructing reasons for their moods that they think are linked to the seasons but instead are linked to social psychological stressors? Could the weather, in combination with social psychological variables explain the relationship between season and well-being and/or condition this relationship? Could attribution play a part in the implication of the seasons and climate as a cause of winter mood?

Although the sociological literature does not directly address these questions, the goal of this thesis is to explore seasonal mood in populations employing a theoretical framework provided by the social sciences. Theories of both stress and attribution may help in part, to explain some of the contradictory findings that the epidemiological literature on SAD presents.

CHAPTER 2 - THEORY AND LITERATURE REVIEW

As stated in the introduction, this study has as its primary concern a contradiction which derives from the current epidemiological literature on Seasonal Affective Disorder. However, all three areas of the SAD literature serve to inform the discussion. These areas are: 1) Descriptions of the various clinical symptoms and therapies related to SAD; 2) Competing physiogenic models which describe how SAD works; and 3) Epidemiological findings related to the symptoms of SAD in populations. Most of the literature supports the SAD phenomenon, however a few findings suggest that factors other than light may be involved in SAD.

Description and Treatment of SAD: Clinical Studies

Norman E. Rosenthal and associates described the syndrome called Seasonal Affective Disorder in a paper published in 1984. Twenty-nine subjects, all clinical patients in the Washington, D.C. area and mostly female, had regularly occurring fall and winter depressions that remitted in spring and summer. Along with depression, sadness, irritability and anxiety, patients reported a general increase in appetite (in particular the craving for and consumption of carbohydrates) and weight gain during the fall and winter seasons as well as sleep problems. Drowsiness during the day was also associated

with the syndrome.

The instrument constructed to assess SAD was the Seasonal Pattern Assessment Questionnaire. It involves the retrospective self-rating of changes in mood, appetite, sociability, weight, energy and sleep. Patients are asked to recall changes in these items as part of the assessment of their depressions. A number of questions on weather and climate are also asked. Some sample questions from the questionnaire are: 1) In which month of the year do you feel best/worst? 2) To what degree do the following change with the seasons (sleep, weight, mood, etc.)? 3) Do short/cold, hot/humid, sunny/foggy or long days make you feel in low spirits/markedly improve your energy level? There is also a question on the degree to which the seasons are a "problem" for the respondent (in Thompson et al., 1988). This questionnaire has become the standard by which SAD is assessed both clinically and epidemiologically.

Concurrent with the description of the SAD syndrome, Rosenthal et al. (1984) reported the efficacy of light therapy in the treatment of SAD. They found that the use of full spectrum bright light and dim yellow light (2500 and 300 lux) for three hours before dawn or for three hours after dusk, produced significant anti-depressant effects in the case of the bright light with little result in the case of low light.

They suggested that the anti-depressant effects of light might be due to the suppression of melatonin production by light.

Supportive Findings

Although there is not general agreement on the mechanisms involved in the relationship between light and mood, most clinical studies from around the world have supported the early clinical findings of Rosenthal et al.(1984). Wirz-Justice et al. (1986b) in Switzerland and Thompson and Isaacs (1988) in Great Britain each replicated the Rosenthal et al. (1984) study with similar results. SAD has also been reported in the southern hemisphere (Boyce and Parker, 1988). Kasper et al. (1989b) have described a milder form of SAD called sub-syndromal SAD.

A further association of light and winter depression was established with the development of phototherapy and various instruments for its delivery. Initially, phototherapy was conducted clinically on an out-patient basis. Subsequently patient-administered home therapies were developed and popularized. Delivery of phototherapy was compared in a study by Karen T. Stewart et al. (1990) using standard large light boxes and a portable head mounted device. Depressive symptoms were reduced by both the head-mounted device and the light box with no significant difference between the two.

A study by Jonathan W. Stewart et al. (1990b) has supported the claim that SAD is a syndrome separate from other kinds of depression. They found significant differences in the way in which SAD patients and atypical depressives responded to light therapy. The relative lack of response on the part of ATD patients suggested that SAD and ATD are separate syndromes.

There is also some support for the findings of Rosenthal et al. (1984) with regard to appetite, in particular the consumption of carbohydrates. Krauchi and Wirz-Justice (1988) found a winter seasonal pattern in the frequency of consumption of carbohydrates and fibre-rich food amongst SAD patients as compared to normal controls. As these symptoms are considered to be unusual in depressives, the authors suggest that they may be explained by the known relationship between carbohydrates and the regulation of serotonin production in the brain. Rosenthal et al. (1989) subsequently found that subjects with SAD who were fed a carbohydrate-rich diet reported a slight decrease in fatigue levels as compared to normal controls.

In their early research on SAD, Rosenthal et al. (1984, 1985) reported that SAD is found most frequently in younger women. Subsequent studies have corroborated this finding (Rosenthal and Wehr, 1987). Some researchers have reported an

association between SAD and eating disorders which are most common in younger females. Lam (1991) administered the Seasonal Pattern Assessment Questionnaire to 30 patients with SAD, 30 bulimic patients and 25 normal controls. SAD patients had the highest seasonality scores, followed closely by bulimics. Normal controls had the lowest scores. Lam suggests there may be a common underlying mechanism that causes both seasonal mood and bulimic symptoms. In a similar study by Hardin et al. (1991) 41 subjects with either bulimia or anorexia nervosa also had high seasonality scores for winter SAD, comparable to those for SAD patients. Theories of eating disorders have been part of the sociological literature for some time and the Lam (1991) and Hardin et al. (1991) studies may also point to a possible link between SAD and the social psychological factors that are thought to be associated with eating disorders.

Summer SAD

In an article published in the American Journal of Psychiatry, Wehr and his associates (1987b) described a pattern of summer seasonal depression in twelve of their patients which has been called summer SAD (Rosenthal and Wehr, 1987). Summer SAD is thought to be caused by heat and not light. A finding similar to Wehr et al. (1987b) was reported by Gupta (1990b) who studied four patients in northern India, two of whom had symptoms of summer SAD. Spooner Depue and Kraus

(1991) reported low prevalence rates of summer SAD (0.6%) in a sample of college students. This result is similar to the findings of an epidemiological survey conducted by Kasper et al. (1989) who estimated that 0.7% of the population was afflicted with summer SAD. Although its prevalence is relatively low, summer SAD calls into question the operation of a simple mechanism that can be associated with seasonal mood and moves this syndrome far from the stage occupied by winter SAD and phototherapy.

To summarize, the clinical literature presents the following picture of SAD: winter SAD is found mostly in females. It is characterized by a number of symptoms including depression, sleep disorders and increased food consumption. Remission of symptoms has been associated with phototherapy. Some patients with eating disorders exhibit symptoms and response to light therapy similar to SAD patients. Most of the clinical findings were based on small trials. A separate syndrome, possibly conditioned by heat, called summer SAD, has been reported.

Variations in the Literature

The literature reports some alternative treatments for winter SAD. Dilsaver and Jaecle (1990) found that winter SAD responds positively to the anti-depressant, tranylcypromine.

Of fourteen patients treated, twelve had a full response and two a partial response to treatment as measured by changes in their scores on the Carroll Rating Scale for Depression which was administered during the course of treatment. Symptoms of oversleeping and overeating responded to trancyclopromine treatment. However, this finding may not be inconsistent with the light theory of SAD, as Dilsaver and Jaecle have hypothesised that psychotropic medications may play a part in correcting changed seasonal rhythms that are theorized to be associated with changes in mood and sleep.

Kranz (1991) reported using cognitive therapy as an alternative to phototherapy in a study in which three subjects diagnosed with SAD did not respond to phototherapy. One patient with the symptoms of SAD responded well to cognitive therapy. Tondo and Rudas (1991) reported a case of a 50 year old Italian woman who showed remission of a ten year episode with SAD after the discontinuation of heavy caffeine intake.

Results of phototherapy which contradict the findings of earlier studies were described by Wirz-Justice et al. (1986b). They found no significant difference in the use of bright full spectrum light and low level yellow light in positively alleviating the symptoms of depression in patients. However, after discontinuing treatment, yellow light did not have the lasting effect on the alleviation of depressive symptoms found

with bright light.

The Wirz-Justice et al. (1986b) findings are not inconsistent with a placebo explanation of phototherapy. The possibility of a placebo effect of phototherapy has been suggested in some of the SAD literature (Wirz-Justice, 1986b; Wehr et al., 1987a; Stewart, 1990; Eastman, 1990). Phototherapy as placebo will be discussed further in another section.

Mechanisms That May Cause SAD: Physiogenic Models

The body of literature that deals with the neural and biochemical mechanisms that may be involved in SAD reveals three competing hypotheses: the melatonin hypothesis, the phase-shift hypothesis and the photon counting hypothesis. None of these theories has gained universal acceptance.

The first neurophysiological model for SAD is the melatonin hypothesis proposed by Rosenthal et al. (1984). They had noticed that the duration of melatonin production in their SAD patients increased in relation to the absence of daylight and decreased with the application of phototherapy. They concluded that melatonin was involved in depression in SAD patients. Boyce and Kennaway (1987) studied the intensity of the light required to suppress melatonin production. They

exposed ten normal subjects to four different light intensities (2,500, 2000, 1,500 and 1,000 lux) for two hours during 4 different trials at each light intensity and measured the melatonin levels for each trial. They also measured daytime levels of melatonin. Melatonin was suppressed at all light intensities with 2,500 lux having the strongest suppressive effect of the artificial light intensities. However, based on the results of a subsequent experiment with melatonin, Wehr and Rosenthal (1989) have ruled out its role in SAD (in Blehar and Lewy, 1990).

The second hypothesis, the phase-shift hypothesis, is essentially a relative of the hibernation model for the seasonal variations in the sleep and metabolic patterns of lower mammals as a number of researchers have suggested (Lewy et al. 1988). Morovsky (1988), writing in The Journal of Biological Rhythms, proposed that further study of the similarities between the symptoms of SAD and hibernation in lower mammals (he uses ground squirrels as his example) could inform the study of Seasonal Affective Disorder and its treatment. Zucker (1988), writing in the same periodical, suggested that the study of chronobiology, well documented in animal research, holds promise for understanding seasonal rhythms in humans and the development of possible treatments for SAD. Lewy et al. (1987, 1988), who are supporters of the phase-shift hypothesis, argue that the alleviation of winter

depression depends on correcting abnormally phased circadian rhythms caused by lack of daylight. Studies showing the effectiveness of morning phototherapy over phototherapy at other times of day are the main evidence cited by Lewy et al. (1988) for the veracity of the phase-shift hypothesis. Wurtman (1988) has proposed that phase delay may affect the release of the neurotransmitter serotonin, which in addition to regulating carbohydrate intake in humans, is also known to have anti-depressant effects.

However, Doghramji et al. (1990), while suggesting that phototherapy in the morning was preferred, found that evening phototherapy was as effective in remitting the depression associated with SAD. Wirz-Justice and Anderson (1990) have concluded, upon reviewing a number of studies, as well as their own data, that timing of phototherapy is not necessary for remission of symptoms. These findings may compromise the phase-shift hypothesis.

The third hypothesis is the photon-counting hypothesis which suggests that it is the amount of light, measured by its intensity and length of exposure, that determines the outcomes of phototherapy. It arose after evidence which challenged the role of melatonin as a cause of depression was found. Studies which support the photon counting hypothesis have been conducted by James et al. (1985) and Rosenthal et al. (1985).

Additional support for the photon counting hypothesis comes from a study by Lam (1991) who measured the retinal sensitivity of 19 depressed patients with SAD and 19 normal subjects. Electroocculagraphy (EOG) was carried out regularly on these subjects during five winter months (October through March). Lam found that the EOG ratios in subjects with SAD were significantly lower than those of normal subjects, although there was a great deal of overlap between the two. Lam suggests that SAD may be associated with abnormalities of the photoreceptor pigment epithelium complex of the retina.

Phototherapy as Placebo

The results of a study by Wehr et al. (1987a) are an illustration of the possibility that factors other than light may be involved in the remission of the symptoms of SAD at the clinical level. The study was designed to test whether light treatment was most effective with the light apparatus close to the subjects' opened eyes or whether the light was required only on the skin, in which case the subjects eyes were blocked from receiving light. The researchers found light therapy to be most effective when applied close to the patients' eyes. An unexpected result was that the subjects' expectations tended to predict the outcome of their therapy in either treatment. This result suggests that a placebo effect may be involved where phototherapy is concerned.

The notion of patient expectations is just one of the problems discussed in an article entitled "What the Placebo Literature Tells us About Light Therapy For SAD" (Eastman, 1990). In the article Eastman speculates on how patients' expectations and therefore the results of phototherapy, could be influenced by both the zeal of the physicians and physicians' expectations regarding the outcome of phototherapy. She also discusses the problem of the selection of proper placebo controls in studies of SAD. Eastman does not deny that light therapy reduces the symptoms of SAD. However, the similarities between the SAD trials and other placebo effects that have been reported in the literature, including those involving dose responses, has led Eastman to conclude that

the mere existence of a characteristic time course of response to bright light treatment cannot be used as evidence that bright lights produce an antidepressant effect beyond their placebo effect (p.496).

This conclusion is especially interesting in the absence of a known mechanism for SAD. That is to say, part of the mechanism may indeed be based on light but the attribution of curative powers to this radical, easy to understand and possibly sociable therapy on the part of both staff and patient may also be involved. As noted earlier, other researchers have suggested the possibility of a placebo effect of phototherapy.

Epidemiological Findings

In spite of the lack of a clear mechanism for SAD and some questions about how phototherapy works, the clinical literature has informed most of the epidemiological studies which have followed. A number of surveys have attempted to determine the extent to which Seasonal Affective Disorder is found in a normal population.

Rosen et al. (1990) surveyed four cities in the eastern United States: Nashua, NH; New York City; Montgomery County, Md. and Sarasota, Fl. They looked for a possible link between latitude and the symptoms of SAD. The seasonal Pattern Assessment Questionnaire was administered to a sample of 1,576 subjects through a telephone survey. The study found significantly higher rates of winter SAD and subsyndromal SAD at northerly latitudes, however rates of summer SAD did not vary significantly by latitude.

Rosen and Rosenthal (1991) repeated this survey, mailing questionnaires to 1,671 respondents in three of the four cities surveyed by Rosen et al. (1990). Washington D.C. was substituted for Montgomery County, Md. Respondents were asked to provide information about weight gain, depression, sociability and hypersomnia in winter and summer as well as fall depression. Using factor analysis the researchers found

that factors which are found in winter SAD correlated with more northerly latitude. In contrast to the Rosen et al. (1990) study they found summer SAD correlated positively with more southerly latitudes.

Rosen and Moghadam (1991) surveyed three separate groups of army wives, totalling 408 individuals in Germany, California and Texas, on their seasonal changes in mood and behaviour. The study was conducted in the context of a larger survey on health. The subjects were individuals who had been stationed at any one of the three locations from between 18 to 24 months. More symptoms of winter SAD were found in the German sample than in the California or Texas samples.

Although latitude is the proxy for light in these studies, the results may have other explanations. Better weather at more southerly latitudes, rather than more light, may influence responses. Climatic conditions may also influence sociability as well as the amount of exercise respondents partake in. These factors could, in turn, influence mood. In the case of the army wives, the results could be partially explained by psychological malaise conditioned by distance from home and loved ones. Social distance from German society and culture may also be involved in the conditioning of psychological malaise.

Kasper et al. (1989) used the Seasonal Pattern Assessment Questionnaire in a telephone survey of 416 adults in Montgomery County, a Maryland suburb of Washington, D.C. Twenty-seven percent of the population surveyed reported that seasonal changes in mood were a problem. A smaller percentage had symptoms equivalent to clinical patients with SAD. However, there is some evidence in the Kaspar study that the researchers were not dealing with a population that was naive about SAD. The Washington D.C. area, where the survey was conducted, is where a great deal of SAD research is conducted. One of the questions asked on the survey was if the respondents had heard about SAD. Having heard about SAD correlated with high seasonality scores for female respondents.

The Inventory of Seasonal Variation (ISV) was given by Spont, Depue and Krauss (1991) to 463 college students, between the ages of 20-35 years. Over 80% of the respondents reported winter seasonality and 10% experienced fall as their lowest season. However, this high result could be explained by the nature of the questionnaire itself. It contains considerably more response categories than do other questionnaires. This fact alone may be sufficient to drive the response rate up.

Implied in the results of the Kasper et al. (1989) and Spoont et al. (1991) studies is a causal direction which has light as the independent variable. However, there may be other explanations for these findings. An alternative explanation is that the instruments used in these studies are actually measuring mood which is the result of social stressors. This argument is especially plausible in the Spoont et al. (1991) study which took place on a college campus. There one would expect negative mood to be conditioned in part by various acute and persistent stresses, associated with the role of student. These could be attributed to the weather or seasons. However, none of the aforementioned epidemiological studies contained a measure of current psychological well-being. They have all relied on retrospective reporting.

Albert et al. (1990) have claimed preliminary support for the technique of retrospective reporting based on a two year clinical study of the effects of climate on ten SAD patients. However, a finding by Husby and Lingjaerde (1990) illustrates the problem of employing this technique in populations. In a study conducted on sleeplessness they found that respondents who said they had been bothered by sleeplessness, tended to report the problem in association with the time of year in which the question was asked.

Retrospective reporting is further called into question

by a survey conducted by Hansen, Jacobsen and Husby (1991) in northern Norway. In this survey retrospective reporting was not required. Hansen et al. (1991) measured the presence of current mental distress in Norwegian communities north of the Arctic Circle. Within a larger survey for coronary heart disease three questions about depression, coping problems and insomnia, selected from the General Health Questionnaire (GHQ), were posed. The GHQ depression questions employ a four point scale : 1) not at all, 2) no more than usual 3) somewhat more than usual 4) much more than usual. The respondents were 3,898 men (aged 20-54) and 3,861 women (aged 20-49). The survey took place on four successive winter months from November to February. According to the researchers, when one takes into consideration the extremely short periods of daylight in the months of December and January, the incidence of mental distress obtained from the survey (14% in men; 19% in women) was low. With the exception of insomnia, which was prevalent for women in the month of December the researchers found no significant relationship between month of survey and any of the three symptoms surveyed. Although taken over just four winter months they suggest that their study casts doubt on the role of daylight in conditioning psychological malaise in a general population.

Stress and Attribution Literatures

A number of questions emerge from the literature. The first is what role does light play in seasonal mood? The second is how do the anomolous findings fit the model? Successful cognitive therapy, for example seems to fit better into a psychogenic model of depression. Third, if psychological issues are involved in winter depression in some cases, could there be other conditioners of the relationship between winter and mood? Fourth, how does one account for some of the measurement problems to which studies that employ the retrospective self-reporting of mood states in populations may be vulnerable, as indicated by the results of the Hansen et al. (1991) and Husby and Lingjaarde (1990) studies. The final question is what role do social psychological factors, play in the relationship between seasons and mood in populations?

It has been suggested earlier in the discussion of the placebo effect of phototherapy that the attribution of well-being to light therapy may be involved in therapeutic situations at the clinical level. Is it possible that in epidemiological studies that part of what is taking place is the attribution of current mood states to winter conditions? The literatures dealing with stress and attribution help to inform this discussion.

Studies of stress and "the stress process" have shown that depression and stress are often correlated. (Pearlin et al. 1981; Pearlin et al. 1989; Mirowsky and Ross, 1990). In general the more stress which leads to distress, the more likely there is to be depression. Pearlin et al. (1981) determined a number of predictors of stress and depression. These are generally summarized into three areas: 1) life events and chronic strains, 2) Social support, which includes social integration, perceived social support and received social support, 3) Mastery and Self-esteem. Mirowsky and Ross (1990), in the conclusion of a study which examines depression and control, suggest that control over outcomes varies with social location. Simply put, high socio-economic status and therefore control, lead to lessened levels of depression. Pearlin (1989), in an article dealing with the structural determinants of stress and depression, has suggested that an examination of social and economic factors can give indications of the individual manifestations of stress which lead to depression. In the same article Pearlin refers to the construction of coping strategies which may serve to ameliorate the outcomes of stress. These include strategies which serve to change both the perception and meaning of the situation for the individual.

The literature on attribution also addresses the problem of coping and control in stressful situations. Abramson et al.

(1978) have proposed that attribution may have a self-serving control function which allows the individual to attribute responsibility for outcomes to external rather than internal causes. Seligman et al. (1978) have also shown that for the depressed actor, the responsibility for the cause of events is usually an internal one. This suggests that for these individuals the sense of control associated with coping is problematic. The causes of events become a personal responsibility. On the other hand, one would expect that individuals who may be experiencing some psychological malaise but who are not depressed would tend to attribute the causes of events to external, situational factors. They choose causes that are beyond their control as a way of avoiding self-blame and increasing self-esteem. The work of Abramson et al. (1978) and Seligman et al. (1978) describe a type of attribution which is conditioned by helplessness and depression.

Fritz Heider (1958), an early attribution theorist, studied a number of factors which determine how the layman approaches causal attribution. In particular Heider was one of the first to point out the self-serving function of attribution. He has proposed that a reason chosen by an actor as a cause of behaviour or events "... flatters us, puts us in a good light, and is imbued with an added potency by the attribution" (p. 172). He suggests that attributions must be plausible to individuals who make them. Although Heider did

not deal extensively with the socially conditioned aspects of attribution, he does refer to the work of Mead (1934), the symbolic interactionist. This is done in the context of Heider's discussion of how the perception of the social acceptability of behaviours might affect the kinds of attributions that are made. He refers to Mead's notion of the "generalized other", or that part of the actor's self that has been determined by the body of knowledge and understanding which it shares with other members of society. Heider suggests that "the attitude of the generalized other represents the attitude of the whole community ... the attitudes of the generalized other ... have greater objectivity than [the individual's] personal wants and attitudes" (p.228). This analysis suggests that the culture as a whole plays a part in the attributional process.

Although early attribution theorists merely alluded to the role of social factors in attribution, a number of later researchers have been more specific. Taylor and Jaggi (1974) found differences in the attribution of causality made by Hindus about each other, as compared to attributions made by Hindus about the behaviour of Muslims. Miller (1984) examined the relationship between culture and "everyday social explanation" in a cross-cultural study of attribution in American and East Indian Hindu adults and children. She found that adult Americans tended to attribute the reasons for

behaviours to dispositional factors. In contrast there was a tendency amongst adult Hindus to attribute behaviours to situational factors. She found little to distinguish between the two groups amongst children. Miller explains the differences between the adult groups as being due to the "more individualistic cultural views of the person held by older Americans ... whereas the Hindus' more holistic cultural orientations led them to stress contextual differences"(p. 972). Miller, in both the preamble and conclusion of her study stresses the importance of cultural and structural differences, meaning systems and the "... social aspects of knowledge acquisition" (p. 975). in the study of attribution. The work of Taylor and Jaggi (1974) and Miller (1984) illustrate the importance of the role of social and cultural factors in attribution.

How then, can common place things like weather and seasons become implicated in the attributional process? Miles Hewstone (1989) has suggested that theories of social representation, developed by Durkheim and subsequently by Moscovici, may help to inform the role which culturally derived common knowledge and common sense play in the attribution process. Durkheim has described a broad range of social representations, shared by members of a society which are irreducible and can form part of "... a social reality sui generis" (Hewstone, 1989, p.207). These include myth, science

and religion. Serge Moscovici has observed that knowledge which is used and applied by science, technology and social science, is continually evolving into common sense constructions which become available to the layperson. Hewstone cites Moscovici's work on psychoanalysis as an example. Many concepts and terms from psychoanalysis form part of the common parlance of everyday life, although they may be used in ways not intended by psychoanalysis. Social representations such as these, Hewstone argues, become part of common sense theories regarding many aspects of life.

Applying the theories of Durkheim, Moscovici and Hewstone to seasons and weather one finds weather reporting, meteorology and myth regarding the seasons forming part of a significant social representation. The broadcast media devotes a regular proportion of its time to the reporting of weather conditions. Weather is often implicated as a cause of discomforts and common ailments both physical and psychological. It may be assumed that Canadians share a number of beliefs and feelings regarding the problematic nature of weather and season. This pool of shared beliefs can provide a source of common sense attributional material for many conditions including the causes of mood.

The theory of general attributional style proposed by Harold Kelly (in Brown, 1988) may further inform the

discussion on how common sense notions, including those on weather and season can be used as attributional material. Kelley divides questions of attribution, whether internal or external, into three areas: distinctiveness, consistency and consensus. Using Kelley's schema in relation to winter mood one would tend to find the actor motivated to attribute either many or few winter conditions as the cause of his/her mood (high or low distinctiveness), to attribute mood to just these conditions or others as well (high or low consistency) and to determine whether it is just himself or many others who blame winter conditions for their mood (low or high consensus). Given the social representation of winter in many cultures, including Canada, one would expect a number of individuals to report high distinctiveness (ie. winter conditions in particular), high consistency (winter conditions over a long span of time) and high consensus (many others blame winter for their moods in addition to the respondent) as characterizing the effects of winter on mood when given the opportunity on a questionnaire.

Thus the stress and attribution literatures inform the possibility that some individuals who answer questionnaires could be attributing the outcomes of various life and winter stresses to seasonal and climatic conditions when asked to do so. The stress literature in particular also suggests that both psychological and sociological initiators of the

attribution of mood to winter may be operating.

Problem Statement

It is evident from both the clinical and epidemiological literatures on SAD that there are a number of competing hypotheses and differing results in the study of the relationship between the winter season and mood. In all of the epidemiological studies using the Seasonal Pattern Assessment Questionnaire and its derivations, there is a strong subject-reported effect of the seasons on mood, in particular winter mood. However, in the Norwegian Arctic Circle study, where mood was measured by month from November to February, without reference to seasons or weather, at a latitude where the epidemiological literature suggests winter depression should be high, relatively low depression levels were found. In addition, there were no statistically significant differences in depression during months when there was daylight and months when it was almost completely dark all day. If it is indeed the lack of daylight that results in winter depression both clinically and in a normal population, as a number of theories of SAD attest, how can the different findings in the epidemiological literature be explained?

Perhaps the period of four months, as was the case in the Norwegian study, is too short a period of time with which to

study the possible effects of light deprivation on a population. On the other hand, the retrospective self-reporting of mood in winter may lead to individuals attributing or constructing reasons for their condition that they think are linked to the seasons. It may also be possible that the questionnaires which use the SAD items are in part a kind of mood scale which pick up the effects of other stressors unrelated to season. If these are the case, considerations other than light should partly explain the relationship between season and well-being.

Studies such as the Hansen et al. (1990) study compromise the theory that light causes psychological malaise in a general population. If further inquiry continues to find this to be the case, other interpretations of the symptoms of seasonal mood in populations may be required.

If light is the cause of mood in populations then one should clearly see a variation in mood which corresponds to differing amounts of daylight. If this relationship cannot be shown, then factors other than daylight may be operating. This reasoning is based on the premise, derived from the SAD literature, that seasonal mood in populations is caused by lack of daylight. This premise can only be supported if symptoms of psychological malaise and variation in daylight are measured and found to covary.

Studies similar to the Hansen et al. (1990) study, but conducted during an entire year should answer the question of whether or not there is a variation in depression in a population which corresponds to light. Studies, in which respondents are asked to attribute the causes of mood to winter and seasonal conditions and which also measure current psychological malaise may help to determine to what extent attribution is operating. Variables which are stress related may illustrate the degree to which the relationship of psychological well-being and the attribution of mood to winter conditions can be explained away by social psychological factors.

In the following chapter two hypotheses will be developed. They will test whether or not mood varies by the amount of daylight and as well, if there is a relationship between current mood states, social psychological factors and the attribution of mood to winter. The interpretation of the findings of the second hypothesis will be predicated upon the results of the first.

CHAPTER 3 - METHODOLOGY

In the present chapter two hypotheses are developed and operationalized. Statistical models are proposed with which to test the hypotheses.

Hypotheses

Two competing hypotheses emerge from the literature which can be tested using two existing data sets.

Hypothesis #1

Mood is influenced by the absence of daylight. Accordingly, it is predicted that there will be a statistically significant variation in mood in a population from month to month throughout the year which corresponds to the amount of daylight. That is, the more daylight, the better the mood.

Hypothesis #2

Questions which ask for the retrospective self-reporting of the effects of winter conditions on mood are acting as a psychological well-being scale which is capturing the respondents' attribution of their moods to winter conditions. That is to say, current psychological malaise is a cause of the retrospective attribution of winter mood. Two sub-

hypotheses are indicated.

(1) The relationship between current psychological malaise and retrospective winter mood will be positive.

(2) If current psychological malaise is a cause of retrospective winter mood, then factors which covary with psychological malaise (such as sociability and job fatigue) should reduce the effect of current psychological malaise on retrospective winter mood. Demographic factors should have a similar effect on this relationship. The interaction of demographic factors, in particular younger females, should further reduce the effect of current psychological malaise on winter mood.

Operationalizations

A number of indicators have been selected with which to operationalize the variables found in the above hypotheses. The variables to be operationalized are:

Hypothesis #1:

The dependent variable is the respondent's current mood state. The independent variable is the amount of daylight.

Hypothesis #2:

The dependent variable is retrospective winter mood. The independent variable is the respondent's current state of psychological malaise. The control variables are sociability, job fatigue and selected demographic variables (sex, age, income and education).

For hypothesis #1 the dependent and independent variables were operationalized using several variables from the Canadian General Social Survey of 1991. Three dependent variables were chosen to operationalize mood. Each was examined separately.

The first dependent variable is the Bradburn Affect Balance Scale. The Bradburn Affect Balance Scale is a general measure of psychological well-being derived from the scores of the positive and negative items used in the scale.

Bradburn (1969) describes psychological well-being as a balance between two independent dimensions, negative and positive affect. "Knowledge of a person's standing on one dimension will not allow us to determine his standing on the other " (p. 65). It is the balance between positive and negative affect that measures well-being. The affect balance scale contains ten items, five of which measure positive affect and the remaining five, negative affect. To obtain a measure of affect balance the positive and negative items are

summed for each respondent. The summed negative and positive scores are then subtracted from one another to determine the balance of positive to negative affect.

The collapsed version of the affect balance scale used in this study identifies three classifications of respondent: 1) those who show overall positive affect balance 2) those whose negative affect is equal to their positive affect 3) those who show overall negative affect balance. The three computed classifications are then coded into a derived variable with values from 1 to 3.

While the Bradburn Affect Balance Scale has been widely utilized and its efficacy validated there have also been some concerns expressed about its validity (Bolin and Dodder, 1990). As a result, the Bradburn Affect Balance Scale was also disaggregated and its individual items examined separately, to determine if they showed any substantive or statistically significant variation from the balance scale itself.¹ The individual Bradburn mood items ask the respondent (1=often, 2=sometimes, 3=never):

¹The three point scales employed in both the negative and positive Bradburn items were recoded so that a higher frequency of sentiment being measured is consistently reflected in higher scores for all items. Similarly, the derived variable which is the Bradburn Affect Balance Scale was recoded so that overall positive affect balance is coded 3, negative equal to positive is coded 2, overall negative balance is coded 1.

How often have you felt: on top of the world
How often have you felt: very lonely
How often have you felt: excited/interested
How often have you felt: depressed/Unhappy
How often have you felt: pleased about something
How often have you felt: bored
How often have you felt: proud
How often have you felt: restless
How often have you felt: things were going your way
How often have you felt: upset due to criticism

Mood was further operationalized employing two additional variables related to stress and life satisfaction. The first asks the respondent to describe how stressful life is:

- 1 = Very stressful
- 2 = Somewhat stressful
- 3 = Not very stressful
- 4 = Not at all stressful

This item was recoded so that the higher values reflect a higher degree of stress and the lower values a lower degree of stress. The second item asks respondents how satisfied they are with life:

- 1 = Very dissatisfied
- 2 = Somewhat dissatisfied
- 3 = Dissatisfied - degree not stated
- 4 = Somewhat satisfied
- 5 = Very satisfied
- 6 = Satisfied - degree not stated

As scale value 3 (Dissatisfied - degree not stated) and scale value 6 (Satisfied - degree not stated) of the life satisfaction item contained only one and sixteen cases respectively, they were combined with the scale values which precede them. The collapsed variable was recoded into a four point scale (1 = Very dissatisfied, 4 = Very satisfied).

The independent variable is the month in which the interview was conducted. This variable permits the comparison of affect, life stress and life satisfaction by the month of year in which respondents were surveyed.

For hypothesis #2 the dependent, independent and control variables were operationalized using a second data set. It was obtained from the University of Alberta Population Research Laboratory Alberta Survey of 1992.

The dependent variable, winter mood, is an index of attribution constructed from eight questions. They ask the respondent to report the effects of the seasons in general and winter conditions in particular on their moods. Space limitations on the 1992 Alberta Survey prevented the use of any further measures. A test of reliability confirmed that these items are internally consistent. Determining the alpha coefficient (Cronbach's) is a common way of testing the reliability of such an index (Naruse, 1991). The Cronbach's Alpha for these items is .86. The variables are: (1=Strongly Disagree, 7=Strongly Agree)

During certain seasons I become moody.
During certain seasons I become depressed.
During certain seasons I become tired.
Cold days make me depressed.
Short days make me depressed.
Lack of sunlight makes me depressed.
When it snows it makes me depressed.
The wind makes me depressed.

The independent variable, current psychological malaise, is an index constructed from four questions measuring the respondent's current state of psychological malaise. The Cronbach's Alpha on these items is .78. The scale is composed of the following questions: In the past few weeks: (1= Strongly Disagree, 7= Strongly Agree).

There have been times that I have felt sad or depressed.

There have been times that I have not felt like doing much of anything.

There have been times I have felt blue.

There have been times that I have had feelings of worthlessness.

The following control variables were introduced to determine if the relationship between current psychological malaise and retrospective winter mood would be reduced. Sociability was operationalized using two variables. The first was a question about current satisfaction regarding getting out of the house: (1=Strongly Disagree, 7 = Strongly Agree)

In the past few weeks I have not been getting out of the house as much as I would like.

The second was a question on volunteering (1=yes, 2=no).

In the past year I have done volunteer work.

As volunteering is a dichotomous variable, it was recoded into a dummy variable with 1 = yes and 0 as the reference category, ie., those who have not volunteered within a year's time period.

Job stress was operationalized using two variables, and on self-reported changes in job fatigue over a one year period. These were chosen for this study for their possible explanatory role in the relationship between the respondent's current state of psychological malaise and retrospective winter mood. The two variables were designed to measure changes in job fatigue and were the best examples of stress indicators available in the data set. The questions asked were (1=yes, 2=no. 7=no job):

After a day's work would you say you are more physically fatigued than you were a year ago?

After a day's work would you say that you are more mentally fatigued than a year ago?

As these are nominal variables each was recoded into a dummy variable so that individuals with job fatigue could be compared with all others. (2,7 = 0) (1 = 1).

Demographic controls were operationalized using four variables. These were the respondent's age, sex, number of years of education and personal income. Respondent's sex was recoded into a dummy variable with (0) for males and (1) for females. Personal income was grouped as an ordinal variable with intervals of \$1,999 from \$0 up to \$40,000. Subsequent intervals of \$4,999 were employed up to \$100,000.

To determine whether sex and age interact in their

effects on winter mood, a product term involving the dummy variable for sex and the continuous variable for age was constructed. In order to further illustrate the interactive effect of sex and age, age was dichotomized (18-44 = 0, 45 - 85 = 1) and a fourfold typology created with the sex variable. The four categories are younger males, older males, younger females and older females. The mean retrospective winter mood score was then calculated for each of these categories, the expectation being that younger females would have the highest mean score.

Data Sets

The two data sets employed in this study were the General Social Survey of Canada, 1991 and the Alberta Survey of 1992.

GSS91 Sample

The following description is taken from the GSS91 manual (1991). The population sampled in the General Social Survey of Canada was individuals living in Canada who were 15 years of age and older with the exclusion of residents of the Northwest Territories, the Yukon and full-time residents of institutions. The sampling method was random digit dialling (RDD) excluding households without telephones (less than 2% of the target population).

The ten provinces were each stratified. With two

exceptions the strata were made up of the Census Metropolitan Areas (CMA) and the non-CMA areas. Prince Edward Island did not have a CMA stratum as it has no CMA. Toronto and Montreal were each considered to be separate strata.

In every survey month a random sample of telephone numbers was generated for each stratum. A supplementary stratum of the elderly was gathered roughly doubling the size of the sample for the elderly group.

The sample for the year included 14,875 households. One individual, fifteen years of age or older was selected from households which were part of the Random Digit Dialing sample. A supplementary sample of the elderly was taken, confined to people 65 years and older.

In addition to the elderly being over sampled, the smaller provinces were also disproportionately sampled and therefore a weight variable was added as an adjustment to the sampling methodology in order to allow the sample to be generalizable to the Canadian population. The weight variable was calculated by first dividing the population by the total sample. The resulting quotient was rounded off and used as the denominator for the variable, finalwt. This weighting procedure produced three fewer cases than indicated in the GSS91 codebook and is probably due to an insufficient number

of significant digits in the calculation. The fact that it is a reduction of three cases implies a slight underweighting of some types of cases. This was judged to be extremely slight and was not pursued further.

Collection of data began in the third week of January in 1991 and was completed on the second week of December 1991. The sample of 14,875 was evenly distributed over all twelve months. Interviewing was centred in five Statistics Canada regional offices with calling taking place between 9 a.m. and 9:30 p.m. Monday through Saturday. The majority of interviewers had previous Statistics Canada training but all were given a two day course in the methodology employed by Statistics Canada.

Alberta Survey 1992

The second data set to be analyzed was part of the 1992 Alberta Survey, administered by the Population Research Laboratory at the University of Alberta. Due to limited space on the questionnaire, only the population of Calgary was available for this study. A province-wide sample would have been desirable in order to test for the effect of latitude as well as rural-urban differences.

The following procedures were summarized from the Alberta Survey sampling report (Kinzel, 1992). Respondents were

selected in two stages: first by household and then as part of a selection process within each household. To permit adequate analysis for the City of Calgary a minimum sample size of 400 was deemed necessary. The population universe was all persons 18 years of age or older who were living in a dwelling unit in Calgary that could be contacted by telephone at the time of the survey. The telephone numbers were drawn from updated computer files of five digit telephone banks that are continuously updated by the PRL.

Nursing homes and temporary residences were deleted from the sample. Within the household, one eligible person was selected as the respondent for the, on average, thirty-three minute interview.

The questionnaire was pretested on a total of forty-seven Edmonton area households in November, 1991. The weather was unseasonably cold and snowy. The findings of the pretest showed high correlations among the seasonal and climatic items and the psychological well-being items.

The main interviewing commenced on February 9th, 1992 and was completed by the end of March. The weather in Calgary during that time period was unusually warm. Seventy-nine percent of the interviews were completed in February. The remainder were completed in March. Ninety percent of the

telephoning was conducted from a supervised location at the University of Alberta. Ten call back attempts were made before declaring a telephone number as "no contact". The final sample size in Calgary numbered 420. The response rate was 76%.

Statistical Models

In the previous sections the hypotheses, operationalizations and data collection methods pertinent to this study have been set out. In the present section two statistical models with which the data will be tested are presented.

Hypothesis #1

The hypothesis that mood is influenced by the absence of daylight suggests that there will be a variation in mood from month to month corresponding to the amount of daylight. This hypothesis was modelled statistically by comparing the means and standard deviations of mood by month and employing an analysis of variance test to show whether or not there were significant differences amongst means across months. This test was done on the Bradburn Affect Balance Scale as well as separately on each item making up the scale. The life stress variable and life satisfaction variable were similarly tested.

Hypothesis #2

Hypothesis #2 states that current psychological malaise is a cause of retrospective winter mood. Hypothesis #2 predicts that the introduction of control variables which covary with psychological malaise should reduce the effect of current psychological malaise on winter mood.

An initial univariate descriptive analysis was performed on the disaggregated daylight, sunlight, snow, cold and wind attribution items in order to determine the frequency of response. The findings are reported separately.

Multiple regression analysis was chosen to statistically model the relationship between current psychological malaise, the aggregate index of winter mood and the control variables. A general multiple regression model of the type proposed for hypothesis #2 would be described as follows:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots b_nX_n + e,$$

where Y is the dependent variable, X₁ the dependent variable, X₂ ... X_n the control variables and e is an error term.

The particular regression model proposed for hypothesis #2 would be described as follows:

$$Y(RWM) = a + b_1(CPM) + b_2(S1) + b_3(S2) + b_4(JF1) + b_5(JF2) + b_6(SEX) + b_7(AGE) + b_8(INCOME) + b_9(EDUCN) + b_{10}(SAGE) + e,$$

where: RWM = Retrospective Winter Mood (dependent variable)
CPM = Current Psychological Malaise (independent variable)
S1 = Sociability 1
S2 = Sociability 2
JF1 = Physical Job Fatigue
JF2 = Mental Job Fatigue
SAGE = Interaction term, SEX x AGE.

The fourfold typology, constructed to further explore winter mood by sex and age, was examined independently. Analysis of variance was employed to test whether or not there was a significance difference amongst the means of winter mood being examined.

These statistical tests were chosen to demonstrate the efficacy of the predictions presented in hypotheses #1 and #2. The findings are reported in the following chapter.

CHAPTER 4 - RESULTS

In this chapter the results of the tests of the hypotheses developed in Chapter 3 are presented. Detailed results are in tabular form and are integrated throughout this chapter. Hypothesis #1 predicted, on the basis of the general epidemiological findings in the SAD literature, that a statistically significant variation in mood would be found in the population of Canada corresponding to a variation in daylight as measured by month of year. As Table 1 illustrates, the findings show no statistically significant differences from month to month in the Bradburn Affect Balance Scale using an analysis of variance test ($F = 1.13$, $p = .33$).

Table 1

Analysis of Variance examining the effect of month of year on the Bradburn Affect Balance Scale*

Month	Affect Balance Score	
	Mean	Std Dev
1 January	2.6470	.5441
2 February	2.6503	.5558
3 March	2.6309	.5594
4 April	2.5963	.5982
5 May	2.6389	.5515
6 June	2.6442	.5715
7 July	2.5926	.6000
8 August	2.6270	.5857
9 September	2.6442	.5702
10 October	2.6330	.5822
11 November	2.6607	.5434
12 December	2.6282	.5859

Total Sample: 11,924;

Significance by F-test; ($F = 1.13$, $p = .33$)

*Higher scores indicate higher degree of well-being.

The substantive findings, reveal that three months,

November, January and February have the highest overall affect scores. December, in contrast, has the eighth lowest while April, July and August have the lowest affect scores overall.

A disaggregation of the Bradburn Affect Balance Scale (Tables 2-11) reveals that although several of the constituent items show statistically significant variation by month, most of the results do not show a consistent variation with the month of year in which negative mood is predicted to be highest. An elaboration of this finding reveals that the variable shown in Table 2, How often have you felt on top of the world? is statistically significant ($F = 4.01$, $p < .0000$) however, the lowest scores occur in March, May, June, July and August while the highest scores are obtained in the fall and winter months.

Table 2

Analysis of Variance examining the effect of month of year on the item: How often have you felt on top of the world?*

Month	Mean	Std Dev
1 January	2.0643	.5997
2 February	2.0469	.5988
3 March	1.9747	.6907
4 April	2.0280	.6917
5 May	2.0144	.7309
6 June	1.9936	.7051
7 July	1.9521	.7160
8 August	1.9296	.7310
9 September	2.0558	.6711
10 October	2.0701	.6760
11 November	2.0485	.6444
12 December	2.0232	.6580

Total Sample: 11,924

Significance by F-test ($F = 4.01$, $p < .0000$) *Higher score indicates higher frequency of feeling on top of the world.

The variable, How often have you felt very lonely, shown in Table 3, is not statistically significant.

Table 3
Analysis of Variance examining the effect of month of year on the item: How often have you felt very lonely?*

Month	Mean	Std Dev
1 January	1.3594	.5943
2 February	1.3376	.5925
3 March	1.3130	.5582
4 April	1.3239	.5784
5 May	1.3624	.5928
6 June	1.3178	.5750
7 July	1.3522	.5861
8 August	1.3111	.5751
9 September	1.3473	.5681
10 October	1.3762	.6056
11 November	1.3066	.5649
12 December	1.3740	.5936

Total Sample: 11,656

Significance by F-test ($F = 1.66$, $p = .08$)

*Higher score indicates higher frequency of loneliness.

The variable, how often have you felt excited/interested in something, shown in table 4, is statistically significant ($F = 4.46$, $p < .0000.$). February and December have the lowest excitement/interested scores. November is also low. However, scores for April and July are lower than those for October, November, January and March. September, August and June have the highest excited/interested scores overall.

The variable, how often have you felt depressed/unhappy, is shown in table 5. It is not statistically significant.

Table 4

Analysis of Variance examining the effect of month of year on the item: How often have you felt: excited/interested about something?*

Month	Mean	Std Dev
1 January	2.1774	.6499
2 February	2.0918	.6505
3 March	2.1610	.6370
4 April	2.1326	.6719
5 May	2.1864	.6313
6 June	2.2096	.6633
7 July	2.1444	.6738
8 August	2.2105	.6478
9 September	2.2549	.6395
10 October	2.1641	.6653
11 November	2.1534	.6595
12 December	2.1035	.6603

Total Sample: 11,924

Significance by F-test ($F = 4.46$, $p < .0000$)

* Higher score indicates higher frequency of excitement /interest.

Table 5

Analysis of Variance examining the effect of month of year on the item: How often have you felt depressed/unhappy?*

Month	Mean	Std Dev
1 January	1.3386	.5439
2 February	1.3282	.5616
3 March	1.3101	.5355
4 April	1.3354	.5606
5 May	1.3258	.5292
6 June	1.3000	.5593
7 July	1.3505	.5623
8 August	1.2985	.5752
9 September	1.3230	.5369
10 October	1.3369	.5438
11 November	1.3210	.5348
12 December	1.3303	.5550

Total Sample: 11,924

Significance by F-test ($F = .73$, $p = .71$)

*Higher score indicates higher frequency of depressed/unhappy.

The variable, how often have you felt pleased about something, shown in table 6, is statistically significant

($F = 4.38$, $p < .0000$). With the exception of December, which has the fifth highest score overall, the winter months tend to have lower scores than the spring and summer months. The exceptions are July and April which have the eighth and twelfth lowest scores overall.

Table 6

Analysis of variance examining the effect of month of year on the item: How often have you felt pleased about something?*

Month	Mean	Std Dev
1 January	2.2900	.6135
2 February	2.2331	.5902
3 March	2.2397	.5841
4 April	2.2252	.6269
5 May	2.3052	.6011
6 June	2.3432	.6030
7 July	2.2766	.6027
8 August	2.3119	.6162
9 September	2.3535	.6236
10 October	2.3288	.5974
11 November	2.2713	.6148
12 December	2.3053	.6161

Total Sample: 11,924

Significance by F-test ($F = 4.38$, $p < .0000$)

*Higher score indicates higher frequency of being pleased.

The variable, how often have you felt bored, ($F = 2.24$, $p < .01$), shown in table 7 is statistically significant. Boredom is the highest in July, September, February, September and March and is lowest in November. January is roughly equal to April May and June in terms of boredom. Boredom scores for December are amongst the lowest overall. The variable, how often have you felt proud, shown in table 8, while statistically significant ($F = 7.05$, $P < .0000$), shows that respondents feel the least pride in April and the most pride

during the fall and winter months, ie., from September through January. February and March are somewhat lower but not as low as July and August.

Table 7

Analysis of Variance examining the effect of month of year on the item: How often have you felt bored?*

Month	Mean	Std Dev
1 January	1.4941	.6280
2 February	1.5397	.6471
3 March	1.5217	.6159
4 April	1.4945	.6370
5 May	1.4931	.6060
6 June	1.4934	.6348
7 July	1.5456	.6515
8 August	1.4803	.6382
9 September	1.5495	.6335
10 October	1.5313	.6220
11 November	1.4410	.5892
12 December	1.5056	.6299

Total Sample: 11,924

Significance by F-test ($F = 2.24$, $p < .01$)

*Higher score indicates higher frequency of being bored.

Table 8

Analysis of variance examining the effect of month of year on the item: How often have you felt proud?*

Month	Mean	Std Dev
1 January	2.0885	.6249
2 February	2.0665	.5729
3 March	2.0239	.6093
4 April	1.9435	.6892
5 May	2.0542	.6819
6 June	2.0752	.6414
7 July	2.0048	.6571
8 August	2.0141	.7220
9 September	2.1122	.6214
10 October	2.1450	.6441
11 November	2.1199	.6289
12 December	2.1021	.6524

Total Sample: 11,656

Significance by F-test ($F = 7.05$, $p < .0001$)

*Higher scores indicate higher frequency of feeling proud.

The variable, how often have you felt restless, is shown in table 9. It is not statistically significant.

Table 9
Analysis of Variance examining the effect of month of year on the item: How often have you felt restless?*

Month	Mean	Std Dev
1 January	1.4927	.6872
2 February	1.4219	.6711
3 March	1.4898	.7281
4 April	1.4770	.6969
5 May	1.4735	.7130
6 June	1.4801	.7290
7 July	1.4329	.7105
8 August	1.5023	.7428
9 September	1.4828	.7205
10 October	1.5029	.7312
11 November	1.5296	.7405
12 December	1.4730	.7304

Total Sample: 11,656

Significance by F-test ($F = 1.48$, $p = .13$)

*Higher score indicates higher frequency of feeling restless.

The variable, how often have you felt things were going your way, shown in table 10, is statistically significant ($f = 7.70$, $p < .0000$). With the exception of September, which has the highest score overall, the fall and winter months, ie. September to February, have most of the higher scores. May is approximately equal to February. June has a lower score than either December or January. August is very low with July and April lower still.

The variable, how often have you felt upset due to criticism, shown in table 11, is statistically significant ($F = 7.91$, $p < .0000$). Being upset by criticism does follow a

general winter pattern. The one exception is November in which respondents are the third least likely to be upset by criticism, roughly equal to July.

Table 10

Analysis of Variance examining the effect of month of year on the item: How often have you felt things were going your way?*

Month	Mean	Std Dev
1 January	2.1309	.6465
2 February	2.0781	.5775
3 March	2.0338	.6090
4 April	1.9965	.6913
5 May	2.0711	.6485
6 June	2.1046	.6399
7 July	2.0175	.6517
8 August	2.0481	.6617
9 September	2.2161	.6174
10 October	2.0948	.6092
11 November	2.0972	.6145
12 December	2.1179	.6396

Total Sample: 11,924

Significance by F-test ($F = 7.70$, $p < .0000$)

*Higher score indicates higher frequency of feeling things were going your way.

Table 11

Analysis of Variance examining the effect of month of year on the item: How often have you felt upset due to criticism?*

Month	Mean	Std Dev
1 January	1.4236	.5645
2 February	1.3822	.5240
3 March	1.3860	.5351
4 April	1.2844	.4957
5 May	1.3466	.5541
6 June	1.3261	.5303
7 July	1.3043	.5087
8 August	1.2498	.4732
9 September	1.3457	.5168
10 October	1.3803	.5679
11 November	1.3034	.4996
12 December	1.3601	.5500

Total Sample: 11,924 Significance by F-test ($F = 7.91$, $p < .0000$) *Higher score indicates higher frequency of being upset due to criticism.

The variation in stress by month of year is shown in table 12. It is not statistically significant.

Table 12
Analysis of Variance examining the effect of the month of the year on the item: Would you describe your life as stressful?*

Month	Mean	Std Dev
1 January	2.4293	.8695
2 February	2.4597	.8564
3 March	2.3564	.8672
4 April	2.4388	.8573
5 May	2.3587	.8354
6 June	2.3675	.8710
7 July	2.3955	.8739
8 August	2.3921	.8588
9 September	2.3752	.8239
10 October	2.4239	.8815
11 November	2.4067	.8547
12 December	2.3891	.8619

Total sample = 11924

Significance by F - test ($F = 1.41$, $p = .16$)

*Higher score indicates higher reported stress.

The variation in life satisfaction by month of year, shown in table 13, is statistically significant ($F = 3.73$, $p < .0000$). There is also substantive variation by month. The highest life satisfaction scores are in June and August. January and February rank third and fifth respectively. December and November rank eighth and tenth respectively. July ranks ninth. April and October have the lowest life satisfaction scores overall.

Table 13

Analysis of variance examining the effect of the month of the year on the item: would you describe your life as satisfying?*

Month	Mean	Std Dev
1 January	3.6427	.5950
2 February	3.6388	.6144
3 March	3.6287	.6516
4 April	3.5566	.6713
5 May	3.6403	.5927
6 June	3.6698	.6074
7 July	3.5989	.6348
8 August	3.6704	.5899
9 September	3.6372	.6263
10 October	3.5516	.6709
11 November	3.5902	.6585
12 December	3.5995	.6317

Total sample = 11924

Significance by F-test ($F = 3.73$, $p < .0000$)

*Higher score indicates greater reported life satisfaction.

A number of items were utilized in the testing of hypothesis #1. The results offer little support for the theory that there is a variation in mood in a population by the amount of daylight.¹

Hypothesis #2 stated that current psychological malaise is a cause of the attribution of winter mood. Respondents were

¹An expanded version of the Bradburn Affect Balance Scale was also tested. Although it was found to be statistically significant and some winter months tended to have slightly lower scores, the differences between means were trivial ($\eta^2 = .003$). Substantively, the results also compromised the theory of a variation in mood by light. For example, December, January and June all had the same result. April and July had the lowest result. September had the highest result. November and June were roughly equal. Nevertheless the months were recoded and ordered according to expected amount of light and tested using regression analysis. No statistically significant correlation was found.

asked if they attributed their winter moods to a number of climatic conditions including short days, cold, wind and snow. They were also asked a number of questions on their general psychological well-being during the past few weeks. It was predicted that with the introduction of sociability, job fatigue and demographic control variables, there would be a reduction in the relationship between current psychological malaise and retrospective winter mood.

The substantive results of the disaggregated winter mood index in tables 14-18 show a willingness amongst a substantial minority of respondents to attribute negative mood to various winter conditions. Twenty-four percent (Table 14) of respondents reported a negative mood from cold days (values 5,6 and 7 on a seven point scale). Thirty-one percent reported that short days influenced their moods negatively (Table 15). Twelve percent of respondents reported that their moods were influenced negatively when it snowed (Table 16). In addition, some respondents claimed to be influenced by two climatic conditions that do not occur exclusively in winter. Twenty-eight percent reported that they were influenced negatively by the wind (Table 17) and forty-nine percent reported being influenced negatively by lack of sunlight (Table 18).

Table 14

Distribution of responses to the item: Cold days make me depressed.

		Frequency	Percent
STRONGLY DISAGREE	1	143	34.1
	2	76	18.2
	3	61	14.6
	4	37	8.9
	5	39	9.3
	6	35	8.4
STRONGLY AGREE	7	27	6.5
		-----	-----
Total		418	100.0%

Table 15

Distribution of responses to the item: Short days make me depressed.

		Frequency	Percent
STRONGLY DISAGREE	1	114	27.3
	2	60	14.4
	3	57	13.6
	4	58	13.9
	5	57	13.6
	6	38	9.1
STRONGLY AGREE	7	34	8.1
		-----	-----
Total		418	100.0%

Table 16

Distribution of responses to the item: When it snows it makes me depressed.

		Frequency	Percent
STRONGLY DISAGREE	1	190	45.3
	2	82	19.6
	3	54	12.9
	4	42	10.0
	5	24	5.7
	6	15	3.6
STRONGLY AGREE	7	12	2.9
		-----	-----
Total		419	100.0%

Table 17
Distribution of responses to the item: The wind makes me depressed.

		Frequency	Percent
STRONGLY DISAGREE	1	127	30.2
	2	60	14.3
	3	59	14.0
	4	55	13.1
	5	57	13.6
	6	32	7.6
STRONGLY AGREE	7	29	6.9
Total		420	100.0%

Table 18
Distribution of responses to the item: Lack of sunlight makes me depressed.

		Frequency	Percent
STRONGLY DISAGREE	1	67	16.1
	2	42	10.1
	3	50	12.0
	4	55	13.2
	5	86	20.7
	6	60	14.4
STRONGLY AGREE	7	56	13.5
Total		416	100.0%

A bivariate linear regression was performed to examine the effects of the predictor variable, current psychological malaise, on the dependent variable, retrospective winter mood. The results (Table 19) show that there is a statistically significant relationship between the dependent variable, retrospective winter mood and current psychological malaise ($b = .38$, $p < .001$). The positive slope of .38 means that for every increase of one unit in the seven point scale value of

current psychological malaise there is a .38 increase in the value of retrospective winter mood.

Multiple regression analysis was employed to examine the effects of the control variables on this relationship. As the control variables were introduced into the regression there was some decrease in the slope of retrospective winter mood on current psychological malaise from .38 to a value of .29. The explained variance increased from 16% to 20% overall ($F = 2.39, p < .05$).²

One of the two sociability variables has a statistically significant effect. The positive slope shows that for every increase of one in the scale value of one's dissatisfaction about getting out of the house, there is an increase of .07 in the scale value of retrospective winter mood. In addition, the introduction of the sociability variable reduces the relationship between current psychological malaise and retrospective winter mood from $b = .38$ to $b = .34$.

²The significance of change of R^2 is calculated using the following formula:

$$F = (R_m^2 - R^2) / (k_m - k)$$

where $(R_m^2 - R^2)$ is the change in R^2 , $(k_m - k)$ are the degrees of freedom associated with the numerator, $(1 - R_m^2)$ is the proportion of the unexplained variance and $(N - k_m - 1)$ are the degrees of freedom associated with the denominator.

Table 19

Multiple Regression of Retrospective Winter Mood on Predictor and Control Variables

Current Psychological Malaise	Sociability 1 (var25)	Physical job fatigue (var182)	Sex (var21)	Educ (Var247)	Sociability 2 (var22)	Mental job fatigue (var184)	Age (var222)	Sex x Age (SAGE)	R ²	n
.38*** (.40***)									.16	404
.34*** (.36***)	.07* (.10*)								.17	403
.32*** (.34***)	.07* (.10*)	.35* (.10*)							.18	402
.31*** (.32***)	.07* (.10*)	.38* (.11*)	.24 (.08)						.18	401
.30*** (.31***)	.07* (.10*)	.40* (.11*)	.21 (.07)	-.03 (-.07)					.19	399
.30*** (.31***)	.07* (.11*)	.39* (.11*)	.20 (.07)	-.04 (-.08)	.11 (.04)				.19	398
.29*** (.31***)	.07* (.11*)	.35* (.10*)	.21 (.07)	-.04 (-.08)	.12 (.04)	.09 (.03)			.19	397
.30*** (.31***)	.07* (.11*)	.35* (.10*)	.20 (.07)	-.04 (-.09)	.12 (.04)	.10 (.03)	.002 (.03)		.19	393
.30*** (.31***)	.07* (.11*)	.37* (.10*)	1.07** (.37**)	-.04 (-.09)	.12 (.04)	.09 (.03)	.02* (.18*)	-.02* (-.37*)	.20	392

Retrospective
winter
Mood
(Standard
slopes in
Parsiflow)

* two tailed p < .05

** two tailed p < .01

*** two tailed p < .001

One of the job stress variables is statistically significant in the regression. It shows that respondents who report increased physical job fatigue are more likely to report the negative effects of winter on their moods than the rest of the population. Also, the strength of the relationship between current psychological malaise and retrospective winter mood shows a further reduction with the addition of this variable, from $b = .34$ to $b = .32$.

Neither sex, age nor education have a statistically significant relationship with retrospective winter mood.³ However, when education was entered there was a slight increase in R^2 .⁴ In general the results of the regressions incorporating the demographic variables suggest that the attribution of mood to winter conditions occurs with similar frequency throughout most strata of this population.⁵

Even when the interaction of age and gender are introduced into the regression, the statistically significant

³Although the sex variable did reduce the relationship between current psychological malaise and winter mood by .02 the result was not statistically significant.

⁴The change in R^2 is statistically significant ($F = 4.91$, $p < .05$).

⁵Income (var262) was tested and found not to be statistically significant in this regression. Due to the large number of missing cases represented in this variable it was not included in further analysis.

result has little effect on the relationship between current psychological malaise and retrospective winter mood. The results show that as age increases the effect of gender on winter mood is less pronounced for females than for males and there is a slight increase in R^2 .⁶ This is further supported by the analysis of variance of the means in the fourfold typology in table 20.

Table 20
Analysis of Variance examining the effect of Sex and Age on winter mood

	Mean	Std Dev
YOUNG MALES	3.0811	1.4361
OLD MALES	3.3852	1.3643
YOUNG FEMALES	3.6504	1.4030
OLD FEMALES	3.3817	1.4399

Total Cases = 408

Significance by F-test ($F = 8.00$, $p < .01$)

It shows that winter mood is highest for younger females followed by older males and older females whose means are substantively equal. Younger males are least likely to attribute their moods to winter conditions. Hypothesis #2 is confirmed by the data.

In summary, the prediction for hypothesis #1, that there is a statistically significant relationship between mood and daylight was not supported by the data in which the Bradburn

⁶The increase in R^2 is statistically significant ($F = 4.89$, $p < .05$)

Affect Balance Scale was used as the measure of mood. A disaggregation of the Bradburn Affect Balance scale showed that a number of the individual items were themselves not statistically significant. Three of the ten disaggregated items showed statistically significant variation by month of year with scores that do correlate with some months in which lower levels of mood are predicted. However, this is not a consistent result and lends little support for the hypothesis. Similarly, the life satisfaction item, while statistically significant, produced some low and high scores in both summer and winter months and lends little support for the hypothesis that mood varies by the amount of daylight.

The predictions of Hypothesis #2 were confirmed by the data. There is a statistically significant relationship between current psychological malaise and retrospective winter mood. This relationship is partly explained by two of the control variables. They reduce the relationship between current psychological malaise and retrospective winter mood by approximately sixteen percent. This result implies that respondents are willing to attribute the causes of their current moods to a number of winter conditions. The demographic variables have no statistically significant effect on this relationship.

Further implications of the results of the present

chapter will be discussed in chapter 5. A number of areas for future research will also be suggested.

CHAPTER 5 - DISCUSSION AND CONCLUSIONS

In the previous chapter the results of the tests of the hypotheses pertinent to this study were introduced. The present chapter reviews those results and suggests some areas for future study.

Review of Results

Hypothesis #1 proposed that mood was influenced by the absence of daylight. It predicted that there would be a statistically significant variation in mood from month to month throughout the year, corresponding to the amount of daylight. The aggregated Bradburn Affect Balance Scale, its ten disaggregated components, a life stress variable and a life satisfaction variable were used to test this hypothesis. Analysis of the data provided no support for this hypothesis. Of the thirteen items employed, nine were either not statistically significant (including the aggregated affect balance scale) or did not show a pronounced pattern of negative affect based on the amount of light. Four items lent some support to the prediction of hypothesis #1. Interest/excitement and being pleased about something are generally lower in winter than in summer. Being upset due to criticism tends to be higher in winter than in summer. There are exceptions for each of these items which compromise the light theory and undermine support for the hypothesis being

tested.¹

Hypothesis #2 was confirmed by the data. There was a willingness by a large minority of the population to attribute their moods to various winter conditions. A statistically significant relationship between current psychological malaise and winter mood was found. Two of the control variables (sociability and job fatigue) explained away some of this relationship. The demographic variables played no part in the relationship between current psychological malaise and winter mood but the interaction of sex and age showed that younger females are somewhat more likely to attribute mood to winter than are other parts of the population.

Discussion

There are a number of findings worth noting from this study. First, the findings of hypothesis #1 call into question the part that daylight plays in the conditioning of mood in a population. This finding is consistent with a study by Hansen et al. (1991) in northern Norway, which found no variation in depression between months in which there was daylight and months in which there was relatively little daylight.

¹This was also the case with the more expanded Affect Balance Scale

The interpretation of the results of the second hypothesis are predicated on the findings of the first. The results of hypothesis #2 lend some support to the stress and attribution models of population mood and suggest that a number of factors other than daylight may be operating. There is a willingness on the part of a large minority of the population to attribute mood to various climatic conditions. There is a strong relationship between current psychological malaise and the tendency to attribute depression to winter conditions. There is also some support for the theory that stress related factors are involved in the attribution of psychological malaise to climate and winter conditions.

Conclusions

This study has provided little support for the theory that lack of daylight results in depressed mood states in populations. It has provided some support for the suggestion that attribution may be one of the factors which implicates climate and seasons as a cause of mood. However, some caution should be used in the interpretation of these results. It is possible that questionnaires which ask for the reporting of current mood states may have their limitations in the study of the epidemiology of seasonal mood. Moving from the micro (clinical) level to the population, the effect of light on mood may be difficult to capture in a population, using an instrument such as the Bradburn Affect Balance Scale. In

studies such as these, sufferers of Seasonal Affective Disorder (at best a clinical phenomenon), may become lost in the results.

On the other hand the reason why studies which use the technique of retrospective reporting of mood turn up symptoms of SAD (in an estimated 90% of the population in some instances) has yet to be explained. Perhaps what is being captured by retrospective questionnaires are various combinations of conditions and effects. These may indeed include the effects of the lack of daylight, the general discomfort of winter, attribution of current psychological states, which themselves may be due to a variety of psychological, physiological and sociological conditioners.

The results of this study point to areas for future research. Life stress could be controlled for more fully in future studies. This is indicated by the finding that part of the relationship between current psychological malaise and winter mood is explained by the job fatigue variable used in the multiple regression analysis of hypothesis #2 in the present study. Further measures of life stress might include mastery, social support and chronic stress. Acute seasonal stress factors could also become part of a more developed model of seasonal mood. This is indicated by the unexpected finding in the present study that some months in which there

is a great deal of daylight show higher levels of negative affect while some months in which there is little daylight show lower levels of negative affect. The reasons for this might be as diverse as the weather, the presence of school age children at home, the stressful or buffering effects of family holidays and/or the visits of out of town relatives. Other factors might be the stress of exams, the imminent loss of jobs in a diminishing economy or the imminent prospect of crop failure in rural areas.

Factors which intervene in the alleviation of stress may also be involved, as indicated in the present study by the part which getting out of the house plays in the relationship between current psychological malaise and winter mood. Further research might control for the ability of respondents to sustain satisfying social relationships in the winter months, to take holidays or break up the winter in other ways. A winter recreational component could further explain the degree to which winter mood may be buffered or exacerbated by these kinds of activities.

The reliability of clinical findings in predicting conditions in a population is given some support by the results of this study in the case of younger females. It would be useful in future studies to control for structural and social psychological factors that may be involved in the

attribution of mood by younger females. These would include the pressures of raising children, single parenthood, family conflict, and the changing roles of women.

Other aspects of attribution might also be examined. Common knowledge held by lay people, in the form of myths regarding the seasons, may play a part in the implication of winter as a cause of mood. Controlling for the possibility that widespread knowledge of SAD (as propagated by the popular media) can influence responses on questionnaires, in which the retrospective self-reporting of mood is required, would also help to inform this discussion.

The relationship between culture and seasonal mood presents a challenging subject for future research. Cultural factors may explain some of the reaction to winter found in the epidemiological studies. Perhaps the relatively low levels of depression found in the Hansen et al. (1991) study reflect a different cultural response to winter in parts of Scandinavia.

Some of the findings of the present study can also be expanded upon in future research. The testing of hypothesis #1 involved only the general population of Canada. Further study might test a number of demographic variables including sex, age, education, marital status and income, as well as measures

of sleep, weight and leisure activity. The various regions of Canada could also be examined for differences in mood by month.

Attribution theory has been employed in this thesis to provide a theoretical framework for the contention that current psychological malaise may be involved in the implication of winter as a cause of mood. This model is in contrast to the medical model presented in the SAD literature which would argue that this causal ordering is reversed. The notions of attribution presented in this thesis are admittedly rudimentary at this stage. However, a further test of the role played by social psychological factors in the retrospective reporting of the effects of the seasons on mood is proposed. The test of hypothesis #2 presented in this study could be repeated during the summer months, for example, the month of June when the length of day is greatest. Then it would be possible to examine the degree to which current psychological malaise predicts the retrospective reporting of winter mood without the possible confounding effects of winter.

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